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Vol. VII—No. 11.

With Plates XX—XXIII.

AN ARCHAEOLOGICAL SURVEY OF HALEAKALA

BY

Kenneth P. Emory

HONOLULU, HAWAII
Bishop Museum Press
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An Archaeological Survey of Haleakala

By Kenneth P. Emory

INTRODUCTION

Haleakala, which is substantially coextensive with east Maui, is the giant volcanic cone of the largest inactive crater in the world. It rises from the sea to a height of 10,000 feet, culminating in a jagged wall 20 miles in circumference which forms the encircling rim of the crater broken only at Koolau Gap and Kaupo Gap. The floor of this crater, an area of about 15 square miles, lies 1000 to 3000 feet below the rim and forms a base from which rise a series of ancient cinder cones overspread by lava flows of various ages.

This enormous pit with its meager plant and animal life and its uncongenial climate seems a most unsuitable place for even temporary settlement. "Tradition throws no light upon any occupancy of the Crater of Haleakala,[1] and few travelers across these desolate wastes have had occasion to wander far from well established trails. It is not therefore surprising that the existence of ruins within Haleakala has but recently come to the attention of ethnologists.

Early in 1920 the Museum received from C. S. Judd, Territorial Forester, a photograph of a walled enclosure on the floor of the crater, and later in the year information from Miss Armine Von Tempsky, transmitted to the Museum by Mr. L. A. Thurston, led to the organization of a field party to investigate reported discoveries. Leaving Honolulu on August 27, Robert T. Aitken and the writer spent seventeen days at Haleakala on a preliminary reconnaissance survey that furnished sufficient data for Mr. Aitken to submit a report recommending further investigation. On October 2, with Antone Gouveia as assistant, the writer returned to

[1] Personal communication, March 23, 1921.

Maui to complete the survey which is the basis of the present report.

The Museum is under special obligation to members of the Von Tempsky family, who have thoroughly explored the crater on their many hunting and camping trips. Their guidance and assistance are largely responsible for the results obtained. Acknowledgment is also made to Mr. H. A. Baldwin, who generously supplied horses and pack mules, and to Mr. W. A. Clark, manager of Grove Ranch, who assisted in many ways. Thanks are due also to Mr. Aitken for the use of parts of his preliminary report which at various points supplement the observations of the writer.

STONE STRUCTURES IN HALEAKALA

PUU NAUE GROUP

Exactly in the center of the Crater a symmetrical gray cinder cone, Puu Naue, rises to a height of 250 feet above the level floor. Its crater dotted inside and out with the beautiful silver-sword plant and stunted pilo bushes, is 198 feet in depth and 750 feet in diameter. At the bottom are three terraced platforms (Pl. XX, *A*). The one on the north slope is in ruins as a large boulder, rolling down from above, has destroyed a good part of the back and front retaining walls. Its horizontal dimensions[2] are 26 feet on the north, 24 feet on the south, 11½ feet on the east, and 10½ feet on the west. The back wall rests on the slope of the cinders. The height of the front wall, though 34 inches at the southeast corner, averages not more than 32 inches. The east wall is not only higher and more solidly built than the others but is twice as wide and presents a table-like top. The structure has the appearance of a stone inclosure, but the whole platform was probably once filled with sand and gravel, so that its surface was level with the lower part of the surrounding wall, as were the other two platforms, which are in a good state of preservation.

Although this structure is in ruins there is nothing to indicate that it is older than the east and south platforms. Possibly the reason for building it farther up on the slopes was that the

[2] Measurements are estimated to the nearest half foot; to be more precise would give a wrong impression, as the construction of the walls was always rough and irregular.

(AINAHOU)
True North
HALEMAU-U
To Olinda
HALEMAU-U
LELEIWI
Holua Cave
No Piko Haua
(Pit)
LELEIWI
CLIFFS
Long
Cave
KEAHUOKAHOLO
Cairns
Rest House
To Makawao
KALAHAKU
Halemau-u Trail
KALAHAKU
CLIFFS
Puu o Ma-ui
Kamoalii
Kaupo
Puuo Pele
Red Hill
KOLEKOLE
HAUPAAKEA

FIGURE 1. Map of Halea
1869 with correcti

KOOLAU GAP
HALEMAU'U
LELEIWI
LAUULU
HANAKAUHI
KALAHAKU
KALAHAKU CLIFFS
LELEIWI CLIFFS
WAIKAU
Aa lava flow
KAUPO GAP
HALEAKALA
HAUPAAKEA
KUIKI
Puu o Pele
Puu Nole
Puu Naue
Puu Hele
Oili Puu
Kaohuku o Laie
Kalapawili
Summit

FIGURE 1. Map of Haleakala. Based on surveys by W. D. Alexander in 1869 with corrections and additions by Kenneth P. Emory

(Scale 1⅓ inches = 1 mile)

large stones near the bottom of the crater had already been utilized in the construction of the other two platforms.

The slightly larger south platform (Pl. XX, *B*) is rectangular, measuring about 26 by 16 feet. Its height along the north front is 2 feet, but the back is merely indicated by a single course of stones. Across the platform is laid a row of small stones making the northern end a nearly square enclosure. Our excavation of this structure proved that the walls had not been trenched or buried by sliding or drifting sands. The upper division had been excavated to a depth of 2 feet by Mr. Aitken. We excavated a pit 4 feet deep below the apparently undisturbed strata of cinders in the lower division and sunk a trench along the front outside wall, but discovered no shells, artifacts, nor skeletal material.

The excavation of the east platform to a depth of 5 to 7 feet below its surface and then under the walls gave us likewise nothing. This platform is 12 feet along the bulging north side, 12 feet on the south, 15½ feet along the east, and 11 feet on the west. The highest part of the surrounding wall is on the west side, where it is 32 inches high.

On a knoll at the southern foot of Naue Cone is a small platform. Its top is not flat like the others but curved up very noticeably toward the south. This platform is 20 inches high, 4 feet wide and 11 feet long, extending east and west and is built solid of local stone on lava bedrock. We discovered this fact by taking down the structure, restoring it again immediately as we were always careful to do. Near this platform we picked up four water-worn pebbles the size of a large egg.

BURIAL AHU IN KAMOA O PELE

Ten minutes' walk across the sands southwest of Puu Naue brings one to the low break in the wall of Kamoa o Pele, a cinder cone, colored an even, soft red. On the floor of its crater is an ahu.[3] (Pl. XXI, *A*.)

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[3] *Ahu* as the term is used in this paper is a cairn built for some purpose by Hawaiians. In Polynesia the word *ahu* signifies heap, or pile, and was often used to designate a stone memorial pile.

We took down the stones of this ahu in such a manner as to be able to restore them. To our surprise, we found the base approximately a rectangle, 6½ feet on the north and south, 5 feet on the east, and 5½ feet on the west. It rests on a flat surface produced by digging into the side of the crater. Excavation for a depth of about two feet under the south end of the ahu brought

Slope of Crater
North
0' 1' Scale 2' 3

FIGURE 2. Sketch of the ahu in the Crater of Kamoa o Pele showing manner of burial.

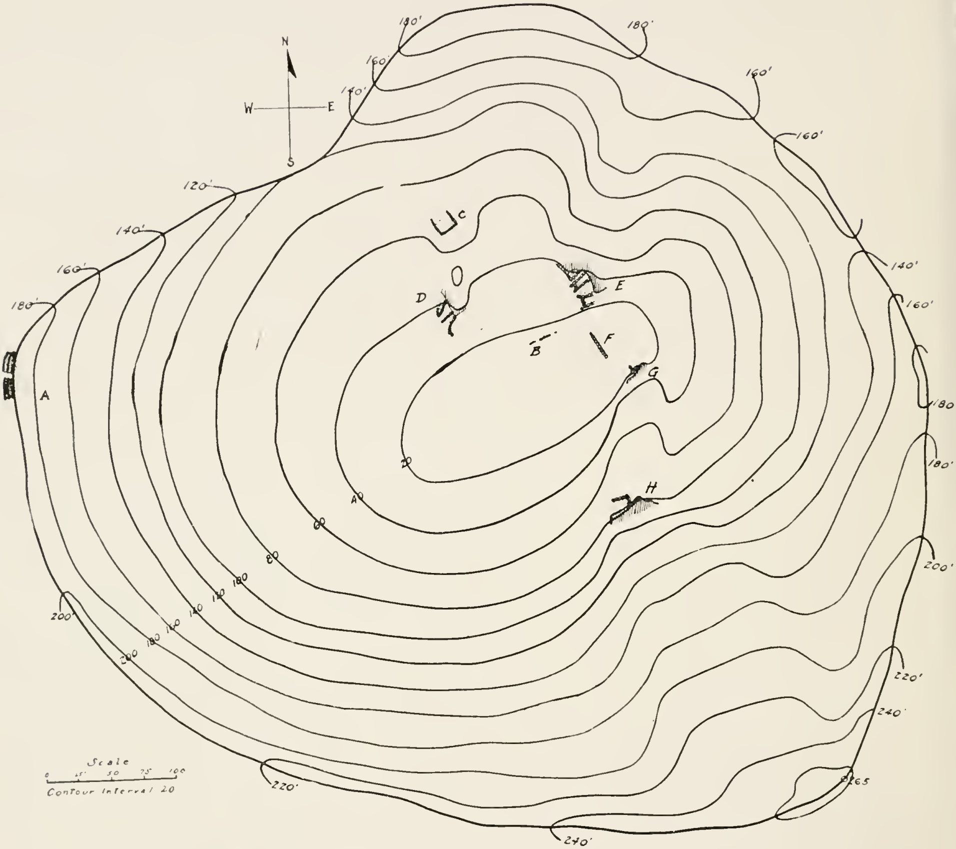
into relief the remains of a body placed face downward, lying southeast and northwest, the head under the south edge of the ahu (fig. 2). The body had been buried grasshopper fashion, the hands were on the back and the legs, bent at the knee, lay alongside the ribs. Two sticks of mamani wood, three inches in diameter and longer than the remains, were above, one on either side of the skeleton. They suggested a stretcher by which the body had been borne to this isolated grave. Near the hand were a few pieces of decayed calabash. The skull and jawbone were in good condition, the teeth almost perfect, and all present except the right canine and the premolar, which had been lost during life. The bones of the lower part of the body were much less well preserved.

One leg bone had been broken by the pressure of the overlaying stones. An examination by L. R. Sullivan showed that the remains were probably those of a female adult about 4 feet 11 inches in height and 35 years of age; the skull was of the Hawaiian type with some Melanesian characteristics. The teeth were slightly decayed and showed advanced pyorrhea in the molar region. An interesting feature of these remains is an area about the size of a silver dollar on the top of the skull, which represents a concussion from a blow that was evidently the cause of death. There seems to have been some knitting of the fractured bone, indicating that death was not instantaneous.

It took four of us with good shovels 50 minutes to assemble the ahu. Two men with calabashes might have dug the pit, laid the sticks and body, filled the pit, gathered the stones and built up the structure in four hours, but probably a much longer time was taken.

HALALII GROUP

Adjoining Kamoa o Pele is the black cone of Halalii which includes two craters separated by a wall a hundred feet high. They must have been the seat of the most violent gaseous activity; the cinders and rocks, particularly of the smaller crater, are brightly colored, every hue from orange to purple. On exploration of the smaller crater on the northwest no trace of ancient structures was found. The larger crater differs from the craters of the other cones examined in that its slopes are broken by outcropping dikes of igneous rock. Some portions of the dikes overhang slightly, and in the shelter thus afforded a series of terraces have been constructed. (See map, fig. 3.) The crater is most easily accessible from the northeast, but the approach from the spatter cone, Pa Puaa o Pele, between Kamoa o Pele and Halalii leads to the ruins of a treble terrace (fig. 3, *A*) which lies on the west rim. This terrace is 36 feet long with a break of three feet in the middle. The top step is 1 foot high along the front and is level with the outside of the crater rim. The two lower steps are 26 inches wide and 1½ and 2 feet high, respectively. It is perhaps significant that from this terrace one may observe all other structures within the crater.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120'
140'
160'
180'
200'
220'
240'
265
Scale
0 25 50 75 100
Contour Interval 20

FIGURE 3. Map of the Crater of Halalii from a plane table survey by Kenneth P. Emory. A, B, C, D, E, F, G, and H mark the site of ruined stone structures.

At the foot of the northern slope we traced a two-foot wall (fig. 3, *B*) over which a slide has passed. The wall appears to be the front of a terrace or of several small terraces. The structure on the northwest side of the crater (Pl. XXII, *A*, and fig. 3, *C*), is a terraced platform 13 by 16 feet, resting on an exceedingly steep slope, and supported by a dike of igneous rock. When first visited only the west wall was in position. On our second visit time was taken to build the walls to their original height and to fill the enclosure with gravel. Excavation sunk to bed rock revealed no human remains, or implements.

Below the platform under the dike is a series of three terraces (Pl. XXII, *A*, and fig. 3, *D*). The bottom terrace, nearly buried by rocks from above, supports a second terrace 3½ feet high, 12 feet long, 5½ feet wide, which in turn supports the top, 1 foot 8 inches high and 14 feet long. With pick and shovel we laid bare the front wall of the terrace which had been 1½ feet underground and 1 foot above. It ran along for 9½ feet, then took a right-angle turn and extended out for 5½ feet. We removed the sand inside the wall down to 3 feet without finding anything of interest. We next dug along the face of the dike which forms the north side of the other two terraces of the series, and extended from this trench into the terraces themselves. On a level with the surface of the top terrace, 5 feet back from the front wall and 5½ feet from the cliff we found a tooth that had belonged to an adult, and then a skull face up. Near at hand were fragments of other bones. There was a stone to the east of the skull and a small stone resting on top of it. On the same contour as the terraces just described and under the north dike is an interesting series of five terraces (Pl. XXII, *B*, and fig. 3, *E*) which measure as follows:

Terrace	Length of front wall Feet	Height Feet	Width of terrace Feet
Lowest	12	2	5
Second	9½	1½	5
Middle	15	4	7
Fourth	18	6	3
Top	11	2	7⅓

Each terrace supports the one above it. The fourth is the largest of the series, and on it has been built the top terrace.

We recovered the bones of an adult female and a child of four years of age within the space of the top terrace but also deep enough to have been in the fourth terrace. The skull of the woman was missing, but the jawbone in good preservation lay right side up 17 inches below the surface and 36 from the front wall of the fourth terrace. No teeth were found. Some of the molars had evidently been lost in life. Ribs and isolated vertebrae extended the width of the grave to the cliff where we found the entire skeleton of the child buried 32 inches deep, turned slightly to its left side, the head towards the northeast. A toe bone was found 5 feet away, buried 1 foot under the east end of the platform, and some of the smaller bones were only 1 foot under the surface and next to the front wall. There was very coarse gravel about the bones and large stones on all sides of them. In examining the bones from this terrace, Mr. Sullivan found an extra femur of a child about three years of age. It is difficult to account for the absence of the long bones of the adult, which were searched for most thoroughly. Either they had been removed before the rest of the skeleton was deposited, or the grave had been opened and the missing parts removed. I think the latter explanation the more plausible, for none of the bones were broken and some of the rib bones and vertebrae were in their appropriate position. To explain the single femur of the child is likewise difficult.

While filling in the top terrace we started the sand sliding from above, and brought to view several small bleached fragments of bone and a very large, badly weathered jawbone with the teeth remaining in it. Bones of the same skeleton were found by digging along the edge of the dike and a pelvic bone was recovered from a crevice in the cliff a foot and a half under the sand. By the side of it were fragments of decayed wood, probably mamani, and bits of a calabash or gourd. The bones were those of a man about sixty years of age and well above the average height. Only a few teeth were left on the lower jaw; the skull and long bones were missing.

From an opening made in the front wall of the fourth terrace next to the cliff, we dug back 8 feet. About 3 feet behind the base of the wall one of the men picked up a perforated dog's tooth, not very well preserved. Against the cliff were a few pieces of a broken gourd and a few white bird feathers not more than an inch long.

Digging in the middle terrace revealed nothing but that the construction was identical with the other Halalii terraces; the walls were of rough, porous pieces of red, yellow, gray, and black lava 6 to 18 inches in long diameter and 3 to 12 inches in short diameter. The stones were from the immediate vicinity and assorted by sizes. The walls were laid with admirable care. In many places they bulged or curved inward a little, but were invariably perpendicular. To build a wall of a single thickness of stone, loose sand and gravel must have been raked in for support as the building was going on. The second structure appeared to be only a supporting terrace. Excavation showed that the lowest terrace was filled in with sand to about 2 feet from the surface, followed by stones about 6 inches in diameter, which in turn were covered with sand.

The north dike which borders the series of five terraces has a break near the end, one side of which appears to have once been walled up and filled with sand. Dr. George Aiken of Wailuku, Maui, reports that in this cavity he discovered ashes and a few bones which were not human.

The front wall of the little terrace under the northeast dike (fig. 3, *B*) is 4 feet long, 2 feet wide, and stands out from the cliff 5 feet. The wall has a wing on each side extending out 2 feet which has held back the gravel from sliding onto the space before the terrace. Against the cliff wall, 34 inches beneath the surface of the terrace, a rib bone was found. After some difficult excavation in sliding gravels, we found a skull, face down, slightly turned to the south, and below this a smaller skull filled with broken bones, and then a third very small skull and jaw. Scattered bones were also found. The largest skull was that of a man about sixty years of age who had lost during life most of his molar and premolar teeth. The other skulls were those of a child of four and a child of three years of age. All were of a pure Hawaiian type.

On the southeast slope stands a single terrace (Pl. XXI, *B*, and fig. 3, *H*) examined by Mr. Aitken. Its situation is such that only a front retaining wall 14 feet long and 3 feet 2 inches high is necessary to make a platform 14 to 18 feet long and about 9 feet wide. The wall is very well laid and is nicely adjusted to the curve of the natural ledge. The stones in the upper courses are the size of a man's head and those in the lower courses twice that size. At the northeast edge of the terrace a crevice in the rock was followed for about eight feet but without finding evidence of use, and a trench on the platform 6 feet deep and 6 feet long revealed nothing.

Excavation on the structure at the place marked on the map (fig. 3, *F*) disclosed a terrace with a front wall 25 feet long and 5 feet 2 inches high at the middle. Position of the back boundary was not determined but it was at least 10 feet from the retaining wall. We trenched for about six feet in from the center and about six feet deep. The large stones prevented further work. A space for about 25 feet in front of the structure seems to have been formerly cleared of stone and may have had some connection with the use of the terrace. Two smooth beach pebbles found at Halalii are considered by Mr. Aitken to be sling stones.

PA PUAA O PELE GROUP

Fifteen yards east of Pa Puaa o Pele is a stone structure 9 feet long and 5 feet wide. The Kaupo natives point this out as the grave of two men and a woman who scratched the sacred sands and were lost in the descending fog and perished. This legend did not seem plausible since the structure closely resembles the platform at the base of Naue and those on the lava flows. Excavating cleared our doubts, for it revealed no burial in or under the structure. It is quite likely that natives perished here but the story of their burial is probably an attempt to explain the existence of the structure. A slingstone was lodged in the corner of the structure and five others were scattered about it. There are about 50 ahus around Pa Puaa o Pele; none half as large as the burial ahu in Kamoa o Pele and some consisting of only three stones one on top of the other.

On the slopes of Kaulupo is an ahu or a platform 7 feet square and 4 feet high. Near it are 15 very small piles of stones each about a foot high.

HANAKAUHI GROUP

Three platforms and two ahus in Hanakauhi Valley, a little pocket lying between Mamani and Kumu Hills, were examined by Mr. Aitken from whose report the descriptions are taken. The three platforms, which are situated respectively in the south, east, and north parts of the valley, are notable for the volcanic bombs used in construction. The isolated south platform is bordered by a wall less than 2 feet high, which forms a rectangle 15 by 7 feet. The space within the walls is filled with sand and gravel forming a surface which corresponds with the slope of the ground.

The poorly preserved east platform with dimensions about 12 by 4 feet is similarly constructed. The north platform (Pl. XXIII, *A*) differs from the other two in the presence of a secondary wall about 5 feet from the outer south wall, which divides the platform into two longitudinal sections. Due west of the north platform is an anomalous structure consisting of two walls forming a right angle that corresponds in position with the southwest corner of the platform. Near the entrance to Hanakuhi Valley are two solidly built ahus constructed of unmarked local stones. The north ahu measures 5 by 7 feet and the south ahu 5½ by 9 feet; both are 2½ feet high and lie east and west. By standing on them the three platforms in the valley can be seen and the approach to the valley watched.

We removed all the rocks of the south ahu and dug under it, discovering nothing. Excavation of north platform (Pl. XXIII, *A*) resulted only in a knowledge of its construction. A wall extending north and south for 19 feet along the Puu Kumu slope of the valley had been built up 2 feet. Then the side towards the slope had been filled in with two layers of stone, half as large as those in the walls, and then coated over with several layers of sand. This made a terrace 5 feet wide, closed at either end by a solidly built wall. At the back of this terrace was laid a single course of volcanic bombs, averaging a foot and a half in diameter, and 3 feet back from this line was laid another row of bombs. The shallow space between was filled level with sand 3 inches deep on the up valley side, and 12 inches deep on the down side. The terraced platform rests on hard-packed cinders in which bombs and pieces of lava are embedded. The south platform rests on a flat solid lava floor and is similarly constructed.

MAMANI GROUP

A group of eleven platforms that presented some types new to us were discovered at the foot of Mamani Hill (Kalua Mamani). A small terraced platform rests on the west slope of Mamani where it joins the floor of the Crater. It measures 12½ by 4½ feet, lies northeast and southwest, and is 1½ feet high along the front. It is very similar to the lower terraces of the north and south Hanakauhi platforms, and its dimensions are the same as the east platform.

Two hundred feet southwest from this platform is an unusual square structure, raised on a knoll. It is 4½ feet on the north, 6 feet on the south, 4½ feet on the east, and 6 feet on the west. It is 1½ feet high except on the east and south sides which are a foot higher, forming a shelf 2 feet wide.

One hundred and fifty feet west of this is an unimposing structure of slabs from an aa lava flow, laid one upon the other to a height of 1½ feet in the form of a rectangle 3½ feet by 7. This and the structures described below lay on the sands at the edge of an old lava flow issuing from Dante's Inferno. They are oriented parallel to it—that is, northeast and southwest—and extended in a line towards the northeast.

The next structure, one hundred feet away, differs markedly from the others in having a T shape. The stem of the T is 3 feet square and on the east joins, about in the middle, the platform, which is 15 feet long by 5 feet wide and 2 feet high. A platform 130 feet farther on is 19½ feet long, 3½ feet wide, and 2 feet high.

Ninety feet beyond this are two structures a few feet apart. They are almost square, measuring 4 by 6 feet, and not more than 2 feet high. Several yards away from these is a platform 13 feet long, 3 feet wide, and 1½ feet high, which rests upon a solid lava flow. Ten yards from this platform is a miniature one, 2 by 3 feet, and 1 foot high.

Two hundred feet south on a part of the same flow is an area 6 feet square and less than a foot high, paved with stones. We removed the stones to make sure that they concealed no crack or opening in the lava. One hundred feet east on the very edge of the flow is the last of the structures, a platform measuring 3 by 5 feet and 3 feet high.

KIHAPIILANI ROAD

The upper part of the lava flow from Dante's Inferno is traversed by an ancient Hawaiian road. We were able to trace its course over the lava, but lost it where it crossed the sands. It is 6 to 8 feet wide and paved with blocks of lava. I learned from Mr. Poouahi at Kaupo that this road was built by a Makawao chief, Kihapiilani, the brother-in-law of Umi, and is supposed to have gone around the base of Mamani Hill, through the Hanakauhi Valley, above Mauna Hina cone, and along the Kalapawili Ridge to the pond Wai Ale on the outside slope of Haleakala, where Kihapiilani is said to have built a dam to hold the waters of the pool. Waterworn pebbles found above Mauna Hina and along Kalapawili Ridge might be considered as evidence. I could obtain no information about the extension of this road west across the floor of the Crater. A natural course would be along the present Halemauu Trail. There is a story current on Maui that Kamehameha built a road across the lava out through Koolau Gap. We could discover no evidence of another road anywhere in the gap.

On the south slope of the hill below Puu Mamani we found two walls, 12 feet and 9 feet long, each consisting of a single course of stones. I believe they were once the front walls of two terraces.

DANTE'S INFERNO GROUP

West from Dante's Inferno and about 200 yards beyond the place where the Kihapiilani Road is lost in the sands are three platforms. The east platform is 14 feet by 3½ feet, and 1½ feet high; the west platform is 10 feet by 5 feet, and 2 feet high. They are 36 feet apart with their long diameters extending northwest, so nearly buried in drifting sand as to appear like natural formations. About 75 feet northwest from the east platform is the remaining platform of the group, 3½ feet by 8 feet, and 1 foot high, oriented like the other two.

KEAHUOKAHOLU GROUP

From Puu Maui, the highest cone in the Crater, a ridge of red sand extends through the middle of Koolau Gap and is crossed by Halemauu trail at Keahuokaholo. Near this point and alongside of the trail is a curved stone wall 34 feet long, 4½ feet wide and 3½ feet high. Sand has nearly covered the middle. One hundred and fifty feet southeast of the wall is an ahu 3 by 4 feet.

On mounting the ridge of Keahuokaholo a surprising number of piles of stone come into view; some having thick bases, others having one stone as a base. We counted between 40 and 50 within a radius of 100 yards. East of the entrance of the trail from the Halalii side are 28 stone shelters. Among these we collected about 15 water-worn pebbles. Five had been laid together next to a ruined shelter and 3 at another shelter. There were about as many ahus and shelters north of the entrance as south of it. The structure farthest away on the north is a platform 9 feet by 3½ feet, and 1½ feet high.

On the west border of Keahuokaholo are about 50 small ahus. A ruined platform lies 100 feet south and another, measuring 3½ feet by 12 feet, is 300 feet to the northeast on the edge of a ravine, and 200 feet farther northeast is a large flat rock, three feet high, covered by a single layer of rough stones.

A few minutes walk from Keahuokaholo on the Leleiwi trail brought us to a platform 3½ feet wide and 12 feet long built of thin slabs of aa lava. About ten minutes later we reached the lava tube known as Long Cave, near which are three large stone sleeping shelters. With Dr. George Aiken as guide, Mr. Walter Walker and myself followed the cave for three-quarters of a mile without reaching its end.

A short distance north of the trail from Long Cave is the pit, Na Piko Haua, 10 feet deep and 15 feet in diameter, in which we found tucked away in crevices the umbilical cords of Kaupo babies. Some of the cords were in colored cloth wrapped with the hair of the child's mother, and others were preserved in small glass bottles; the presence of the recently hidden cords testifies to the strength of superstition among present-day natives. I have heard two explanations of this custom. Mr. Poouahi, from Kaupo, whose own cord is hidden here, claims that placing the cord out of danger of destruction protects the child from becoming a thief. It is difficult to see the connection as rats visit the caves; and besides, better protection could be obtained by hiding the cords in bottles and nearer the villages. The other explanation is from Dr. George Aiken, who at one time saw an old native throw a collection of navel strings into the Bottomless Pit, Kawilinau, exclaiming, "To make the child strong". There must be more significance to the custom. Probably these spots are sacred. The custom prevails also in the region of Mount Waialeale, Kauai.

THE OO GROUP

The uppermost cone on the Sliding Sands Trail contains a small but exceedingly steep crater filled with the debris of great rocks. Viewed from the trail no structures are visible but on the bottom of the crater are the three largest terraces that have so far been discovered. The smallest one, which banks the west slope, is 20½ feet long at the front, 22 feet at the back, 13½ feet wide, and 4 feet 10 inches high. A terrace, 13 feet long, 7 feet wide, and 1 foot high, leads up to it. The next terrace in size is on the north slope and measures 22½ feet long, 15 feet wide, 3 feet 8 inches high. By far the largest is on the southeast slope. It is 38 feet long, 22 feet wide, 6 feet high at its highest part. At the northeast corner is a depressed floor, 15 feet long, 10 feet wide, 3 feet deep. This last structure is very much in ruins.

KEONEHEEHEE TRAIL GROUP

The original form of the east terraced platform of the Keoneheehee group, north of Puu o Pele and on the south side of the trail, is recognizable. It resembles those in Hanakauhi Valley. It extends east and west 13 feet, is 4 feet wide at the east, 5 feet 9 inches at the west end, and 13 inches high. The other structure seems to have retained only two corners, 22 feet apart; it may not be a platform at all.

On the Sliding Sands we picked up half of a water-worn stone, originally the size of an ostrich egg. On the Leleiwi Trail we found another stone this size, and many pebbles.

Up among the cliffs of Kalahaku are caves. In the largest one near the Crater rim, Mr. Walker found last September the bottom part of a gourd which had been used to carry poi. While Dr. George Aiken was with us he found a water-gourd in excellent condition lying on the east slope of the Puu o Maui.

WAI KAPALAOA SHELTERS

At the foot of Puu Maile and opposite the spring, Kapalaoa, I counted over 50 stone shelters in clusters of 3 to 10, and found pebbles lying on the sand about Kahuinaokeone, but none among the Kapalaoa shelters. I do not think the shelters can be considered fortifications; they are not in strategic positions, and are too low for a man to hide behind and to defend himself while throwing sling-stones. As sleeping shelters they would serve tolerably well in clear weather, and isolated ones on the floor of the Crater have been so used even recently. The group of shelters at Kapalaoa and at Keahuokaholo are large enough to serve as sleeping quarters for 150 to 200 men.

HUNTER'S CAVE TERRACES

Until a few years ago Hunter's Cave, under the east rim of the small crater Kalua o Aawa half way up the north wall of the Crater of Haleakala, had been frequently used by sportsmen as a sleeping place. Dr. George Aiken states that there are three terraces in the back of the cave similar in construction to the terraces in Halalii. We were anxious to excavate the terraces in Hunter's Cave but its entrance is sealed by tons of rock which fell from an overhanging ledge about 1918.

LAIE GROUP

On the margin of the Kalua o Umi lava flow, between Laie Cave and the upper trail to Laie, are four platforms having their long dimension east and west. They are about 50 feet apart, each 3 feet high and the other dimensions in feet as follows: the first, 3 x 6; the second, 4 x 6; the third 3 x 6; the fourth, 3 x 5.

HALEAKALA GROUP

Haleakala proper consists of two peaks and a high connecting ridge, on the south rim of the Crater. On Summit Number 1 of Haleakala we found by far the largest stone structure in the Crater region. It has the appearance of a heiau with a base 57 feet by 36 feet, extending lengthwise along the ridge. The supporting wall on the east is 18 feet high, on the west 12 feet, on the north 6 feet, and on the south 15 feet. The top is 24 by 15 feet, roughly, and consists of two level spaces, the one on the east is 6 feet square and is sunk about 2 feet, the other is 6½ feet square and half a foot higher. A wall several feet thick separates these two level places; and in front of the eastern one extends a platform 15 feet long and 6 wide, almost overhanging the rim of the Crater. Two survey cairns have been erected on the edifice. Otherwise it is well preserved. On and near this structure ten pebbles were found.

Just east of Summit Number 1, in a dip of the ridge, is a large, rectangular stone shelter, 27½ feet long, 8 feet wide on the east, 3 feet wide on the west, with walls averaging 2 feet high, measured on the inside. There are two fireplaces 9 feet apart and 2 feet square. The eastern one contains 1 inch of solid earth covering 7 inches of white ash; in the other was found two inches of soil covering small pieces of burnt wood. Below the large shelter are four or five smaller shelters in ruins.

Half an hour's walk farther along the crest of the ridge brought us to another rectangular shelter, 6½ feet wide and 13½ feet long, with walls 3 feet high. Among the scattered rocks of the enclosure, a fireplace, 3 feet square, was found against the south wall. Other smaller shelters lie on the near-by slope. Fifty yards east in the lowest part of the ridge between the summits of Haleakala Mountain we discovered a platform with a flat stone-paved top, 4½ by 8 feet, and 34 inches high, extending east and west. A few small shelters in ruins lie 50 yards beyond, one a small wall a foot high around the mouth of a cave.

A platform crowns Summit Number 2 and near at hand are six small shelters in ruins. The platform was 20 feet long, 3 or 4 feet wide, with the wall towards the Crater 3 feet high. A survey cairn has been erected on its east end. Along the ridge we found five more pebbles and two small pieces of horned coral.

OTHER STRUCTURES ON THE RIM

In exploring the north rim of the Crater from Hanakauhi summit to Palaha, we found two platforms. One is merely a pavement of large smooth rocks meauring 6 feet by 18 feet overlooking Kalua o Umi. The other platform on the summit of Hanakauhi, is completely in ruins. Our attention was first directed to this platform by the following remark made in the Coast and Geodetic Survey records of the station. For Hanakauhi: "Station Mark: a pillar of stone 10 feet high *on an ancient platform,* maliciously demolished in 1884." On the west slope of Red Hill is a group of 25 shelters, and between Red Hill and Kolekole Hill another group of 8 or 9 with a great many small ahus. The craters of three large cones in the desolate Haupaakea section of the rim are barren of structures.

The summit of White Hill is completely covered with large, strongly constructed shelters. Just west of the summit cairn a crevice in a small cliff is sealed by stones and cement. On the ground ten feet away is a table composed of four large, flat stones one on top of the other with cement between. These are the work of W. D. Alexander during his survey of Haleakala and, together with the large stone corral near by, should not be confused with the Hawaiian structures in the crater.

Dr. George Aiken and Mr. W. J. D. Walker of Hamakuapoko, Maui, report a platform on the rim of the Crater just north of White Hill.

Hawaiian Names of Places Within the Crater

On the published maps of Haleakala the names of some of the principal cinder cones, peaks, and important localities are lacking or misplaced, and some are different from the names used by the natives familiar with the region. To remedy this defect we procured the services of a Hawaiian, Leonard Poouahi, an intelligent man forty-six years of age, who lives at Kaupo. In company with this reliable guide and his son, Joseph, the entire extent of the crater was visited and as exact information as possible obtained regarding the pronunciation, spelling, and the meaning of geographical terms. The result is shown in the following list to which definitions have been added by Thomas G. Thrum, as indicated.

CRATERS AND CINDER HILLS

Halalii (Ha-la-li'-i). Contracted form of hala alii.
Honokahua (Ho-no-ka-hu'-a). Joined foundation (Thrum).
Kahuina o ke One (Ka-hui'-na o ke O'-ne). Place where the sands meet.
Kalua o ka Oo. The pit of Oo (Thrum). (Kalua o ka Aawa of Hawaiian Government Survey map).
Kalua o Umi. Umi's pit (Thrum). On Hawaiian Government Survey map name incorrectly assigned to the cone, Halalii.
Kalua Mahoe (Ma'-hoe). The twin pit.
Kamoalii (Ka-moa-li'-i). Contraction of moa alii, name of one of the Pele family (Thrum).
Ka moa o Pele. The fowl of Pele.
Kaulupo (Ka-ulu'-po). The night growth (Thrum).
Mauna Hina (Hi'-na). Mount Hina. (Hina, the traditional mother of Ma-ui.)
Namana o ke Akua. Wonders of evidences of the deity (Thrum).
Oili Puu (o-i'-li). Hill shot out (Thrum). To be distinguished from Puu Oili.
Puu Nole. Nole means to chide, to grumble secretly (Andrews).
Puu Hele. Moving hill (Thrum). Probably means the hill where people pass (Emory).
Puu Kauaua (Ka-u-au'-a). The haughty one.
Puu Kumu. Foundation hill (Thrum).
Puu Maile (Mai'-le). Maile hill. Named for the fragrant evergreen vine (Thrum).
Puu o Pele. Hill of Pele. Pele is supposed to have made the crater one of her abodes.
Puu o Maui (Ma-u'-i). Hill of the demi-god, Maui.
Puu Naue (Na-u'e). Trembling hill (Thrum).

SLEEPING CAVES

Holua (Ho-lu'-a). Place for playing the ancient sliding game, holua (Thrum). Cave of the North Wind (Emory).

Ilailau (I-lai'-lau). Ilailau is an edible plant.
Kiikii. To make hair artificially white (Thrum).
Laie. A common place name.
Ana ma ka Uahi. Cave by the smoke.

PITS

Kawilinau (Ka-wili-na'u). The twist of pain (Thrum). Perhaps the twisting of an object let down into the pit by a thread.
Na Piko Haua. Hiding place for navel strings.

OTHER NAMES

Halemauu (Hale-mau'-u). Grass house situated north of Leleiwi. (Incorrectly located on the Hawaiian Government Survey map.)
Haleakala (Hale a-ka-la). House of the sun. Properly the name of a peak on the south wall of the crater. The peak has two summits, commonly referred to as Number 1 and Number 2.
Kalahaku (Ka-la-ha'-ku). Meeting place of leaders.
Kalapawili (Ka-la-pa-wi'-li). Winding or twisting ridge.
Kaluanui (Ka-lua-nu'-i). The big pit. Name of the crater below Palaha, and also of the peak at the end of the ridge.
Kapalaoa (Ka-pa-la-o'-a). The ivory ornament.
Keaku (Kea-ku'). Standing clear or universally white (Thrum).
Keoneheehee (Ke-one-hee-he'-e). Sliding sand.
Keonehili. Braided sand.
Keonekapu. Sacred sands. To scratch or pollute these sands is supposed to bring down the fog and cause one to lose his way and perish, as did the woman and two men whose traditional grave is a few feet east of Pa Puaa o Pele.
Kuiki (Ku-i'-ki). Stand a while (Thrum).
Kumuiliahi (Ku-mu-ili-a'-hi). Sandalwood stump.
Lauulu (Lau-u'-lu). Breadfruit leaf.
Pakaoao (Pa-kao-a'-o). Sleeping shelters built under the supervision of Aoao (Mr. L. A. Thurston).
Palaha (Pa-la'ha). Spread out flat (Thrum).
Paliku (Pa-li'-ku). Standing cliff. Term used for several different cliffs.
Pa Puaa o Pele. The pig pen of Pele.
Puali o Koa Nui o Kane. Company of big soldiers of Kane. Or if Puali means here a gap in a ridge, gap (guarded by) of the big warrior, Kane.
Hanakauhi (Ha-na-ka-u'-hi). Perhaps, maker of mists or giver of protection. Uhi means a veil or covering, and also to protect or hide.
Waikau (Wai-ka'-u). The natives gave the **k a t** sound (wai-tau).
Waikekeehia (Wai-ke-kee-hi'-a). Crooked waters.

Summary of the Survey

The survey of Haleakala has revealed the existence of 58 stone terraces and platforms, 9 groups of open stone-shelters, several hundred ahus, and a section of an ancient paved road. The time at our disposal was sufficient to examine, measure, and photograph these structures, to make a plane table survey of

Naue, Halalii, and Hanakahi and to collect archaeological specimens. Of the 101 slingstones picked up in the Crater, none were artificially shaped. They may have been used by natives in hunting flocks of plover. We excavated and then restored 5 platforms, 10 terraces, and 3 ahus.

The construction of the terraces and platforms was determined and some evidence obtained regarding their age and purpose. A satisfactory explanation of these structures must await a comparative study of Hawaiian stone structures elsewhere.

The small terrace (fig. 3, *D*) under the northeast dike in the Halalii Crater appears to have been constructed to conceal the human remains found there, but it is unlikely that all the structures in Halalii were built for this purpose. Some of them, in particular the skilfully made top terrace in the series of five, may antedate all burials.

During the course of the work I gained the impression that the facts are opposed to the view that the terraces and platforms are either house foundations, fortifications, places for hiding things, or burial sites. The only feature which these mysterious structures seem to have in common is a square or rectangular paved flat surface, from 1 to 6 feet above the ground, from 3 to 20 feet wide, and from 4 to 40 feet long. The terrace may have served a different purpose from the platforms, but if a flat surface was the result desired, they may have been used for a single purpose as altars upon which sacrifices were laid. An altar would naturally assume the shape of a platform when erected on level ground, and of a terrace when erected upon a slope. If these platforms are altars and peculiar to the Haleakala region, they would represent altars to a special or local deity, perhaps to Lilinoe, Goddess of Haleakala.

Note by Thomas G. Thrum

The various ruins described by Mr. Emory are probably associated with the contentions of the ancient kings of West Maui for the coveted districts of Kaupo, Kipahulu, and Hana with its strategic point, Kauiki. That the route through the crater by way of Kaupo Gap was the established course, is evidenced by the stone-marked roadway and dam building of Kihapiilani,[4] a king of Maui, "who caused the road from Kawaipapa to Kaholaoaka to be paved with smooth rocks, even to the forests of Oopuloa, in Koolau, Maui."

The stone shelters are a necessary protection against the fog, rain, and cold wind frequently experienced at high altitudes. A number of shelters on the rim of the crater are known to be of modern construction. Some of them may have been used as stations for robbers, the professional *olohe,* who waylaid travelers in out of the way places, for several well-known localities in the islands are traditionally known as headquarters for robber bands. So important a route for the trade of Maui is not likely to have been overlooked.

The use of the craters within Haleakala as burial places, far removed from places of habitation, is quite in keeping with ancient Hawaiian practice. Distance and difficulties were no bar to faithful execution in carrying out the instruction of a dying relative or friend.[5]

Tradition refers to several localities on Haleakala as burial places of the chiefs of Nuu.[6] One such cave was known to be used by people of Hawaii.[7]

The five-terraced structure in Halalii crater (Pl. XXII, *B,* and fig. 3, *E*) resembles the four-terraced heiau of the Polihale temple at Mana, Kauai, but its location and the buried bones within its walls indicate perhaps a different purpose in construction. Occasional burials in heiaus took place, but they appear to have been rare and restricted to high chiefs and priests, persons qualified to conduct religious ceremonies. Women were strictly kapued from entering a heiau's sacred precincts in life, so naturally would not be allowed to desecrate it in death.

It is not improbable that the structure in the commanding location on Summit Number 1 is a heiau, though the bards make no mention of it. If such it was no doubt—like the heiau formerly on the rim of Kilauea—designed for the worship of Pele, but to be lost in tradition must have long antedated the Kilauea structure.

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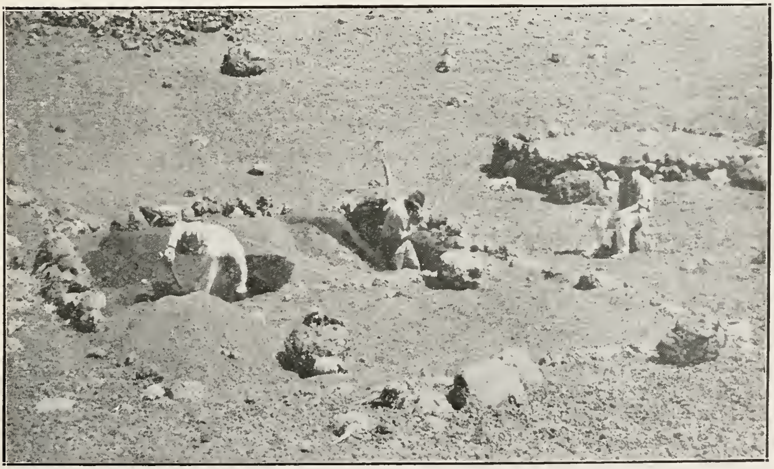
[4] B. P. Bishop Mus. Mem., vol. 5, p. 176. 1918-1919.
[5] Idem, vol. 4, pp. 232-234. 1916-1917.
[6] Idem, vol. 5, pp. 570-72, 1917-'18.
[7] Pogue, J. F., Ka Moolelo Hawaii, p. 30, Honolulu, 1858.

Reference to the place of deposit of the "umbilical cords of Kaupo babies" (page 16), and to the superstitions relating to the practice illustrates the strong hold of ancient customs on Hawaiians. The practice may be traced back a thousand years or more, and throws light on the name chants of Puna-imua, Hema, Kahai, and others, which mention not only the place of deposit of the *piko* (umbilical cord) but other evidences of birth, hid in different locations, an ancient method, it may be, of birth registration. Whatever may have been the original design in the custom, the facts recorded in name chants may be used as a means of identification, or proof, of Hawaiian birth, particularizing it to locality. It is evidence which may be used to refute New Zealand's claim that these celebrated pioneers in Pacific voyaging came from the Southern Seas.

The various sizes of the numerous ahus mentioned by Mr. Emory need occasion no surprise, considering the various purposes for which they were customarily designed. It was a recognized custom of Hawaiians to erect stone piles—pile is one meaning of the word ahu—as way marks, memorials of parties traveling or resting, division points of survey, and also as guides to the most accessible routes of travel. One such marks the safest of three ridges leading from the rim of the crater to the district of Nuu. That some ahus mark burial places is in accord with the present practice in certain districts of Maui and of Hawaii, and perhaps elsewhere. Most, if not all, of the ahus of three stones, one upon another, are tributes to the deity of the locality and are designed by travelers to assure safety in their journey.

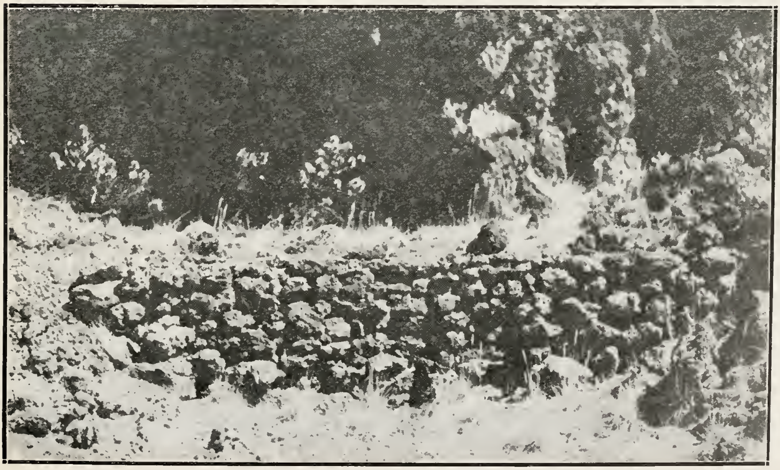
A. PLATFORMS IN PUU NAUE CRATER VIEWED FROM THE HIGHEST POINT ON THE RIM.
A man and dog stand at the bottom.



B. EXCAVATING IN THE SOUTH PLATFORM, PUU NAUE GROUP. THE EAST PLATFORM SHOWS ON THE RIGHT AND THE NORTH PLATFORM IN THE UPPER LEFT CORNER.

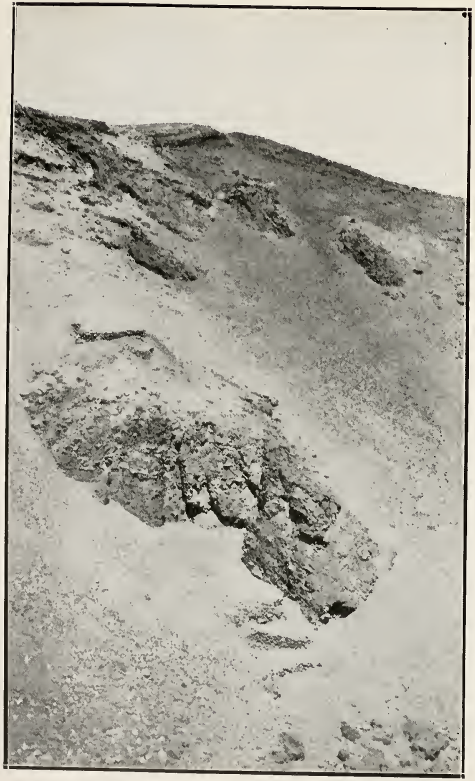
A. BURIAL AHU IN KAMOA O PELE FROM NORTHEAST.

Photograph by R. T. Aitken.

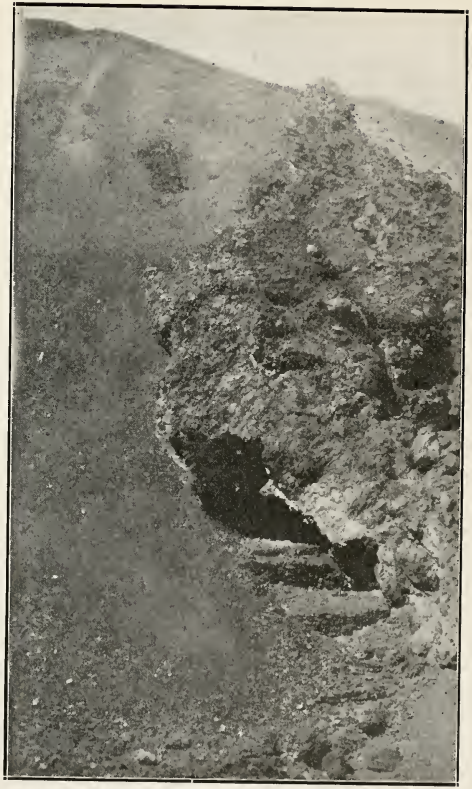


B. LARGE SINGLE TERRACE, HALALII GROUP.

Photograph by R. T. Aitken.



A. PLATFORM AND SERIES OF THREE TERRACES, HALALII.



B. SERIES OF FIVE TERRACES, HALALII.

A. NORTH PLATFORM, HANAKAUHI GROUP.

B. NORTH PLATFORM, LAIE GROUP. A TYPICAL PLATFORM ON THE LAVA.

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